

What is claimed is:

(create object representing resource, assign simple name and home, display simple name, possibly display home)

- 5 1. A method for representing a resource in a computing system environment, the method comprising the steps of:

creating an object to represent a resource in the computing system environment;
assigning an object identifier to the object, the object identifier including at least a simple name of the object and a home of the object;

- 10 displaying at least one representation of the object on a graphical user interface, each of the at least one representation of the object including the simple name of the object; and

- wherein if a home condition exists for one of the at least one representation of the object displayed on the graphical user interface, the representation of the one of the at least one representation of the object further includes the home of the object, and if a home condition does not exist, the representation of the one of the at least one representation of the object displayed on the graphical user interface does not include the home of the object.

- 20 (Add object into an object hierarchy)

2. The method of claim 1 wherein the step of creating an object includes the step of:

associating the object with at least one location within an object hierarchy such that the object becomes a child object of at least one parent object in the object hierarchy, the object hierarchy representing relationships between resources in the computing system environment which are represented by objects in the object hierarchy;

25 wherein the at least one location to which the object is associated in the object hierarchy includes a home location identifying a home object in object hierarchy under which the object is initially associated as a child object, so as to define a home context for the object; and

wherein the step of assigning the object identifier assigns the home of the object to be the home location identifying the home object for that object in object hierarchy.

(suffix)

- 5 3. The method of claim 2 wherein the step of assigning an object identifier to the object comprises the steps of:

receiving a simple name for the object to uniquely identify that object; and

- assigning a suffix to the home of the object if the home of the object is not unique in the computing system environment, such that object identifiers for objects having a
10 home that is not unique will be different from each other based on the suffix.

(home object)

4. The method of claim 2 wherein the home location to which the object is associated is a simple name included in an object identifier assigned to the home object associated
15 with that home location, such that if a home condition exists, the at least one representation of the object displayed on the graphical user interface includes the simple name of the object followed by the simple name of the home object associated with the home location of the object.

- 20 (display hierarchy, home condition if out of home context or non-unique)

5. The method of claim 2 wherein the step of a displaying at least one representation of the object on a graphical user interface comprises the step of:

- displaying the object hierarchy on the graphical user interface to convey the relationships between resources in the computing system environment, such that certain
25 of the at least one location of the object in the object hierarchy is displayed on the graphical user interface; and

wherein a home condition exists for one of the at least one representation of the object displayed on the graphical user interface if displaying that representation of the object at that location in the object hierarchy in the graphical user interface causes one of:

- 30 i) the object to be displayed out of a home context of the object; and

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ii) the object to be displayed non-uniquely in a context in which the object is displayed;

such that the occurrence of a home condition causes the one of the at least one representation of the object to be displayed in a qualified manner in that location in the object hierarchy in the graphical user interface.

(home condition if user specifies view qualified objects)

6. The method of claim 1 wherein a home condition exists if a user of the graphical user interface indicates that representations of objects are to be displayed on the graphical user interface in a qualified manner, such that the at least one representation of the object displayed on the graphical user interface in a qualified manner includes the simple name of the object followed by the home of the object.

(home object must be first ancestral non-transparent object)

15 7. The method of claim 2 wherein the home object in the object hierarchy, for which the home location is identified by the home of the object, is a first non-transparent ancestral home object in the object hierarchy.

(Group object)

20 8. The method of claim 2 wherein the object is a group object created to represent a plurality of related resources in the computing system environment, such that objects in the object hierarchy below the group object share a common relationship to each other identified by the group object.

25 (Transparent group object)

9. The method of claim 8 wherein:

the group object is a transparent group object having a home identified by the home location of a first non-transparent ancestral home object in object hierarchy under which the transparent group object is initially associated as a descendent child object; and

wherein objects subsequently created as child objects of the transparent group object each have a respective home identified by the home location of the first non-transparent ancestral home object in object hierarchy under which the transparent group object is initially associated as a descendent child object.

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(Terminal group object)

10. The method of claim 8 wherein:

the group object is a terminal group object having a home identified by the home location of a home object in object hierarchy under which the terminal group object is initially associated as a child object; and

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wherein objects subsequently created as child objects of the terminal group object each have a respective home identified by the home location of the home object in object hierarchy under which the transparent group object is initially associated as a child object.

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(functional and organizational relationships, display hierarchy)

11. The method of claim 2 wherein there are a plurality of objects represented in the object hierarchy and wherein the relationships between objects represented in the object hierarchy include functional relationships and organizational relationships between certain of the objects represented in the object hierarchy; and

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wherein the step of a displaying at least one representation of the object on a graphical user interface includes the step of displaying the object hierarchy on the graphical user interface to convey the functional and organizational relationships between resources in the computing system environment.

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(storage, computer and SAN resources, user can manage via gui)

12. The method of claim 11 wherein:

the plurality of objects represented in the object hierarchy represent resources in the computing system environment including storage system resources, computing system resources, and storage area network resources;

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wherein a user of the graphical user interface can manage resources associated with object in the object hierarchy via selection of representations of objects in the object hierarchy displayed on the graphical user interface; and

5 wherein all objects containing a representation in the graphical user interface have a simple name and a home that combine to define a single name space for all objects in the computing system environment irrespective of what those objects represent.

(object appears in more than one location in hierarchy, use qualified if non-home context)

10 13. The method of claim 2 wherein there are multiple representations of the same object within the object hierarchy and wherein representations of the object that appear in the graphical user interface in a non-home context are displayed in the graphical user interface in a fully qualified manner so as to indicate the simple name of the object followed by the home of the object.

15 (moving and possibly renaming)

14. The method of claim 2 further including the steps of:

moving the object to a new home location in the object hierarchy such that the object has a new home context; and

20 determining if the simple name for the object uniquely identifies the object in the new home context for the object with respect to other object having the same home context, and if the simple name for the object does not uniquely identify the object in the new home context for the object, altering the simple name to provide a unique simple name for the object in the new home context.

25 15. The method of claim 14 wherein the step of altering comprises appending a suffix to the end of the simple name of the object such that the simple name uniquely identifies the object in the new home context.

30 16. The method of claim 1 wherein the object can be represented in a fully qualified manner to indicate a specific instance of the resource associated with that object by

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representing the object with the simple name of the object followed by the home of the object.

17. A computer system, comprising:

5 a display;
 a memory system;
 a processor; and
 an interconnection mechanism connecting the display, the processor and the
 memory system;

10 wherein the memory system is encoded with a resource management application that when performed on the processor, produces a resource management process that includes a graphical user interface for representing a resource in a computing system environment on the display of the computer system, the resource management process causing the computer system to perform the operations of:

15 creating an object in the memory system to represent a resource in the computing
system environment;

assigning an object identifier to the object in the memory system, the object identifier including at least a simple name of the object and a home of the object;

displaying at least one representation of the object on the graphical user interface
20 on the display of the computer system, each of the at least one representation of the
object including the simple name of the object; and

wherein if a home condition exists for one of the at least one representation of the object displayed on the graphical user interface, the representation of the one of the at least one representation of the object further includes the home of the object displayed on the graphical user interface, and if a home condition does not exist, the representation of the one of the at least one representation of the object displayed on the graphical user interface does not include the home of the object.

(Add object into an object hierarchy)

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18. The computer system of claim 17 wherein when the resource management process causes the computer system to perform the operation of creating an object, the resource management process causes the computer system to perform the operations of :

associating the object with at least one location within an object hierarchy in the memory system such that the object becomes a child object of at least one parent object in the object hierarchy, the object hierarchy representing relationships between resources in the computing system environment which are represented by objects in the object hierarchy in the memory system;

wherein the at least one location to which the object is associated in the object hierarchy includes a home location identifying a home object in object hierarchy under which the object is initially associated as a child object, so as to define a home context for the object; and

wherein the step of assigning the object identifier assigns the home of the object to be the home location identifying the home object for that object in object hierarchy.

(suffix)

19. The computer system of claim 18 wherein when the resource management process causes the computer system to perform the operation of assigning an object identifier to the object, the resource management process causes the computer system to perform the operations of :

receiving a simple name for the object to uniquely identify that object; and
assigning a suffix to the home of the object if the home of the object is not unique in the computing system environment, such that object identifiers for objects having a home that is not unique will be different from each other based on the suffix.

(home object)

20. The computer system of claim 18 wherein the home location to which the object is associated is a simple name included in an object identifier assigned to the home object associated with that home location, such that if a home condition exists, the at least one representation of the object displayed on the graphical user interface includes the simple

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name of the object followed by the simple name of the home object associated with the home location of the object.

(display hierarchy, home condition if out of home context or non-unique)

21. The computer system of claim 18 wherein when the resource management process causes the computer system to perform the operation of displaying at least one representation of the object on a graphical user interface, the resource management process causes the computer system to perform the operations of:

displaying the object hierarchy on the graphical user interface to convey the
10 relationships between resources in the computing system environment, such that certain
of the at least one location of the object in the object hierarchy is displayed on the
graphical user interface; and

wherein a home condition exists for one of the at least one representation of the object displayed on the graphical user interface if displaying that representation of the object at that location in the object hierarchy in the graphical user interface causes one of:

- i) the object to be displayed out of a home context of the object; and
- ii) the object to be displayed non-uniquely in a context in which the object is displayed;

such that the occurrence of a home condition causes the one of the at least one
20 representation of the object to be displayed in a qualified manner in that location in the
object hierarchy in the graphical user interface.

(home condition if user specifies view qualified objects)

22. The computer system of claim 18 wherein a home condition exists if a user of the
25 graphical user interface indicates that representations of objects are to be displayed on the
graphical user interface in a qualified manner, such that the at least one representation of
the object displayed on the graphical user interface in a qualified manner includes the
simple name of the object followed by the home of the object.

30 (home object must be first ancestral non-transparent object)

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23. The computer system of claim 18 wherein the home object in the object hierarchy in the memory system, for which the home location is identified by the home of the object, is a first non-transparent ancestral home object in the object hierarchy.

5 (Group object)

24. The computer system of claim 18 wherein the object is a group object in the memory system created to represent a plurality of related resources in the computing system environment, such that objects in the object hierarchy below the group object share a common relationship to each other identified by the group object.

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(Transparent group object)

25. The computer system of claim 24 wherein:

the group object is a transparent group object having a home identified by the home location of a first non-transparent ancestral home object in object hierarchy under which the transparent group object is initially associated as a descendent child object; and

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wherein objects subsequently created as child objects of the transparent group object each have a respective home identified by the home location of the first non-transparent ancestral home object in object hierarchy under which the transparent group object is initially associated as a descendent child object.

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(Terminal group object)

26. The computer system of claim 24 wherein:

the group object is a terminal group object having a home identified by the home location of a home object in object hierarchy under which the terminal group object is initially associated as a child object; and

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wherein objects subsequently created as child objects of the terminal group object each have a respective home identified by the home location of the home object in object hierarchy under which the transparent group object is initially associated as a child object.

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(functional and organizational relationships, display hierarchy)

27. The computer system of claim 18 wherein there are a plurality of objects represented in the object hierarchy and wherein the relationships between objects represented in the object hierarchy include functional relationships and organizational relationships between
5 certain of the objects represented in the object hierarchy; and

wherein when the resource management process causes the computer system to perform the operation of displaying at least one representation of the object on a graphical user interface, the resource management process causes the computer system to perform the operation of displaying the object hierarchy on the graphical user interface to
10 convey the functional and organizational relationships between resources in the computing system environment.

(storage, computer and SAN resources, user can manage via gui)

28. The computer system of claim 27 wherein:

15 the plurality of objects represented in the object hierarchy represent resources in the computing system environment including storage system resources, computing system resources, and storage area network resources coupled to the computer system and operating in communication with the resource management process via a network interface;

20 wherein a user of the graphical user interface can manage resources associated with object in the object hierarchy via selection of representations of objects in the object hierarchy displayed on the graphical user interface; and

wherein all objects containing a representation in the graphical user interface have a simple name and a home that combine to define a single name space for all objects in
25 the computing system environment irrespective of what those objects represent.

(object appears in more than one location in hierarchy, use qualified if non-home context)

29. The computer system of claim 18 wherein there are multiple representations of the same object within the object hierarchy in the memory system and on the graphical user
30 interface and wherein representations of the object that appear in a non-home context in

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the graphical user interface are displayed in the graphical user interface in a fully qualified manner so as to indicate the simple name of the object followed by the home of the object.

5 (moving and possibly renaming)

30. The computer system of claim 18 wherein the resource management process further causes the computer system to perform the operations of:

moving the object to a new home location in the object hierarchy such that the object has a new home context; and

10 determining if the simple name for the object uniquely identifies the object in the new home context for the object with respect to other object having the same home context, and if the simple name for the object does not uniquely identify the object in the new home context for the object, altering the simple name to provide a unique simple name for the object in the new home context.

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31. The computer system of claim 30 wherein when the resource management process causes the computer system to perform the operation of altering, the resource management process causes the computer system to perform the operation of appending a suffix to the end of the simple name of the object such that the simple name uniquely
20 identifies the object in the new home context.

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32. The computer system of claim 17 wherein the object can be represented on the graphical user interface in a fully qualified manner to indicate a specific instance of the resource associated with that object by representing the object with the simple name of
25 the object followed by the home of the object.

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33. A computer program product having a computer-readable medium including computer program logic encoded thereon that, when executed on a computer system having a coupling of a memory system, a processor, and a display that displays a
30 graphical user interface, the computer program logic is executed on the processor, and the

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computer program logic provides a method for representing resource in a computing system environment by causing the processor to perform the operations of:

creating an object in the memory system to represent a resource in the computing system environment;

5 assigning an object identifier to the object in the memory system, the object
 identifier including at least a simple name of the object and a home of the object;

displaying at least one representation of the object on the graphical user interface on the display of the computer system, each of the at least one representation of the object including the simple name of the object; and

10 wherein if a home condition exists for one of the at least one representation of the
object displayed on the graphical user interface, the representation of the one of the at
least one representation of the object further includes the home of the object displayed on
the graphical user interface, and if a home condition does not exist, the representation of
the one of the at least one representation of the object displayed on the graphical user
15 interface does not include the home of the object.

34. A computer system, comprising:

a display;

a memory system;

20 a processor; and

an interconnection mechanism connecting the display, the processor and the memory system;

wherein the memory system is encoded with a resource management application that when performed on the processor, produces a resource management process that includes a graphical user interface for representing a resource in a computing system environment on the display of the computer system, the resource management process configuring the computer system with:

means for creating an object in the memory system to represent a resource in the computing system environment;

[illegible]

means for assigning an object identifier to the object in the memory system, the object identifier including at least a simple name of the object and a home of the object;

means for displaying at least one representation of the object on the graphical user interface on the display of the computer system, each of the at least one representation of the object including the simple name of the object; and

wherein if a home condition exists for one of the at least one representation of the object displayed on the graphical user interface, the representation of the one of the at least one representation of the object further includes the home of the object displayed on the graphical user interface, and if a home condition does not exist, the representation of the one of the at least one representation of the object displayed on the graphical user interface does not include the home of the object.

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